PUBLIC MEETING ON THE PROPOSED LOW-LEVEL RADIOACTIVE WASTE DISPOSAL RULEMAKING

Chip Cameron, Facilitator

May 12, 2015
NRC Public Meeting
Austin, TX

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Agenda

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Time	Topic	Speaker
6:00 pm	Opening remarks and NRC staff introductions	Chip Cameron
6:10 pm	Discussion of background and need for rulemaking	Larry Camper
6:30 pm	Discussion on process for submitting comments	Stephen Dembek
6:45 pm	NRC presentations on proposed rule language (questions and comments from the public after each discussion topic)	David Esh
8:50 pm	Summation and closing remarks	Larry Camper

PUBLIC MEETING ON THE PROPOSED LOW-LEVEL RADIOACTIVE WASTE DISPOSAL RULEMAKING

Larry W. Camper, CEP,REP, CIPM

Director

Division Of Decommissioning, Uranium Recovery, and Waste Programs

Office of Nuclear Material Safety and Safeguards

May 12, 2015
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Austin, TX

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Objective

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To discuss the proposed revisions to the Commission's low-level radioactive waste disposal regulations, encourage the submittal of comments on the proposed rule language, and answer questions and receive comments from the public.

Why are we doing this rulemaking?

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Require low-level radioactive waste (LLW) disposal licensees or license applicants to ensure that LLW streams that are significantly different from the LLW streams considered in the current 10 CFR Part 61 regulatory basis can be disposed of safely.

Staff/Commission Interactions

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Large quantity of depleted uranium

↓

Staff analyses and recognition

↓

Commission directions

↓

Proposed rulemaking

↓

Compatibility

↓

Agreement state applicability

↓

Outstanding actions

Purpose and Scope Provisions in Current Rule (10 CFR 61.1(a))

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The regulations in this part establish, for land disposal of radioactive waste, the procedures, criteria, and terms and conditions upon which the Commission issues licenses for the disposal of radioactive wastes containing byproduct, source and special nuclear material received from other persons. Disposal of waste by an individual licensee is set forth in part 20 of this chapter. Applicability of the requirements in this part to Commission licenses for waste disposal facilities in effect on the effective date of this rule will be determined on a case-by-case basis and implemented through terms and conditions of the license or by orders issued by the Commission.

Federal Register Notice - Proposed Rule for Public Comment

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B. Who would this action affect?

This proposed rule would affect existing and future LLRW disposal facilities that are regulated by the NRC or an Agreement State.

Rationale for Current Rulemaking

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-Depleted uranium (especially from enrichment facilities)

-LLW from DOE operations

-Waste forms/volumes

-Blended LLW(greater quantities than previously expected)

-New technologies might generate unexpected LLW waste streams

Public Interactions

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March 20, 2015 – Phoenix, AZ

April 28, 2015 – Rockville, MD

May 12, 2015 – Austin, TX

May 20, 2015 – Webinar on Guidance Document

June 2, 2015 – Columbia, SC

June 9, 2015 – Richland, WA

June 10, 2015 – Salt Lake City, UT

Post rulemaking actions

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Backup Slides

CLI-05-20 Memorandum and Order (2005)

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The Commission is aware that in creating the § 61.55 waste classification tables, the NRC considered depleted uranium, but apparently examined only specific kinds of depleted uranium waste streams – "the types of uranium-bearing waste being typically disposed of by NRC licensees" at the time. The NRC concluded that those waste streams posed an insufficient hazard to warrant establishing a concentration limit for depleted uranium in the waste classification tables. Perhaps the same conclusion would have been drawn had the Part 61 rulemaking explicitly analyzed the uranium enrichment waste stream.

Continued on next page →

CLI-05-20 Memorandum and Order (2005)

But as Part 61's FEIS indicates, no such analysis was done. Therefore, the Commission directs the NRC staff, outside of this adjudication, to consider whether the quantities of depleted uranium at issue in the waste stream from uranium enrichment facilities warrant amending section 61.55(a)(6) or the section 61.55(a) waste classification tables.

Commission Direction: SRM-SECY-08-0147 (2009)

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Previously, in the adjudicatory proceeding for the Louisiana Enrichment Services (LES) license application, the Commission determined that depleted uranium is properly classified as low-level radioactive waste. Although the Commission stated that a literal reading of 10 CFR 61.55(a)(6) would render depleted uranium a Class A waste, it recognized that the analysis supporting this section did not address the disposal of large quantities of depleted uranium. Outside of the adjudication, the staff was tasked to evaluate this complex issue and provide specific recommendations to the Commission.

Commission Direction: SRM-SECY-08-0147 (2009)

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Two tasks:

- Specify a requirement for a site-specific analysis, technical parameters (i.e., new definitions and performance period) to support such analysis, and develop a guidance document.
- "…in a future budget request, the staff should propose the necessary resources for a comprehensive revision to risk-inform the Part 61 waste classification framework, with conforming changes to the regulations as needed, using updated assumptions and referencing the latest ICRP methodology…" "…This effort should explicitly address the waste classification of depleted uranium…"

Commission Redirection: SRM-COMWDM-11-0002 /COMGEA-11-0002 (2012)

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- Flexibility to use current International Commission on Radiological Protection (ICRP) dose methodologies
- Two-tiered period of performance:
  - Tier 1: Compliance period covering reasonably foreseeable future
  - Tier 2: Longer period based on site characteristics and peak dose to a designated receptor, that is not a priori
- Flexibility to establish site-specific waste acceptance criteria based on performance and intruder assessments
- Balance Federal-State alignment and flexibility

SRM-COMWDM-11-0002 /COMGEA-11-0002 (2012)

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The changes considered as part of the current rulemaking should be limited to revisions to address the four issues identified. The staff should, separate from any actions resulting from this SRM, continue to engage stakeholders to pursue the possibility of the other risk-informed revisions to 10 CFR Part 61 outlined in SECY-10-0165. *Continued on next page*

SRM-COMWDM-11-0002/ COMGEA-11-0002 (2012)

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Recognizing that the path forward on revisions on the issues outlined in SECY-10-0165 depend in part on the final content of the limited rulemaking, the notation vote paper providing the staff's recommendations on which, if any, of the risk-informed revisions in SECY-10-0165 should be implemented should be submitted to the Commission after completion of the limited rulemaking.

SRM-13-0001 (2013)

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The staff should end further efforts associated with SECY-10-0165, "Staff's Approach to Comprehensive Revision to 10 CFR Part 61," and proceed with the integrated approach to revising 10 CFR Part 61 as described in SECY-13-0001.

Continued on next page →

SRM-13-0001 (2013)

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After the limited rulemaking is complete, the staff should provide a CA note to the Commission on the second rulemaking effort for the waste classification tables. The CA note should outline the objectives and timeline for developing the regulatory basis of this second rulemaking, in consideration of the outcome of the near-term limited rulemaking that will precede it. The CA note to the Commission should identify the specific comments that have been received on the need for a second rulemaking, and clearly articulate the basis in accepting or dismissing their comments.

Commission Direction: SRM-SECY-13-0075 (2014)

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- The proposed rule should be published with a compatibility category "B" applied to the most significant provisions of the revised rule, including the Compliance Period, the Protective Assurance Period and its analytical threshold, and the Waste Acceptance Criteria.
- Realistic intruder scenarios based on expected activities on and around the disposal site at the time of closure
- Licensing decisions are to be based on defense-in-depth (DID) protections (e.g. siting, waste forms) and performance assessment (PA) goals/insights.
  - This combination of DID and PA is the safety case for licensing.
- Thorough review of guidance by LLW community

10 CFR Part 61 Rulemaking Process and Comment Submittal

Stephen Dembek, Project Manager

Division Of Decommissioning, Uranium Recovery, and Waste Programs

Office of Nuclear Material Safety and Safeguards

May 12, 2015
NRC Public Meeting
Austin, TX

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Part 61

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- Why Rulemaking?
- Timeline
- Comment Submittal
- Draft Guidance Document

Why Rulemaking?

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- Implement Commission policy
- Make provisions generally applicable
- Public process
- Address lessons learned
- Address various recommendations

Part 61 - Timeline

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- Published for comment March 26, 2015 (80 FR 16082)
- Comment period is 120 days, closes July 24, 2015
- Final rule to Commission – approximately 12 months after comment period closes
- Rule effective 1 year after final rule published
- Agreement States - 3 years to develop compatible regulations

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Comment Submittal: Proposed Rule – Low-Level Radioactive Waste Disposal

- Please include Docket ID NRC-2011-0012 in the subject line of your comments.
- **Federal Rulemaking Website:** Go to http://www.regulations.gov and search for documents filed under Docket ID NRC-2011-0012.
- **Mail comments to:** Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Rulemakings and Adjudications Staff.
- **E-mail comments to:** Rulemaking.Comments@nrc.gov. If you do not receive a reply e-mail confirming that we have received your comments, contact us directly at 301-415-1677.
- **Hand-deliver comments to:** 11555 Rockville Pike, Rockville, Maryland 20852, between 7:30 am and 4:15 pm Federal workdays. (Telephone 301-415-1677)
- **Fax comments to:** Secretary, U.S. Nuclear Regulatory Commission at 301-415-1101.

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Part 61 Guidance

Draft NUREG – 2175,
"Guidance for Conducting Technical Analyses for 10 CFR Part 61"

- Draft implementation guidance has also been issued for public comment on March 26, 2015 (80 FR 15930)
  - Can be found in ADAMS at ML15056A516
  - 120 day comment period
  - Final implementation guidance to be published with final rule

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Comment Submittal Implementation Guidance for 10 CFR Part 61

- Please include Docket ID NRC-2015-0003 in the subject line of your comments.
- **Federal Rulemaking Web Site:** Go to http://www.regulations.gov and search for documents filed under Docket ID NRC-2015-0003. Click on the comment icon and complete the Web form.
- **Mail comments to:** Cindy Bladey, Chief, Rules, Announcements, and Directives Branch (RADB), Office of Administration, Mail Stop: 3WFN-06-A44M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

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Questions?

See our Low-Level Radioactive Waste Disposal (Site-Specific Analysis Rulemaking) website: http://www.nrc.gov/about-nrc/regulatory/rulemaking/potential-rulemaking/uw-streams.html

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Overview of Proposed 10 CFR Part 61 Technical Requirements and Guidance

David Esh and Christopher Grossman
Division of Decommissioning, Uranium Recovery, & Waste Programs
Office of Nuclear Material Safety and Safeguards

May 12, 2015 NRC Public Meeting, Austin TX

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Summary

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- Overview
- Rule Topics
  - Analyses timeframes
  - Performance assessment (PA)
  - Intruder assessment (IA)
  - Protective assurance period analyses
  - Performance period analyses
  - Safety case / Defense-in-depth (DID)
  - Waste acceptance criteria (WAC)
  - Other
- Guidance
  - Overview
  - Select examples

Radiation Doses and Limits

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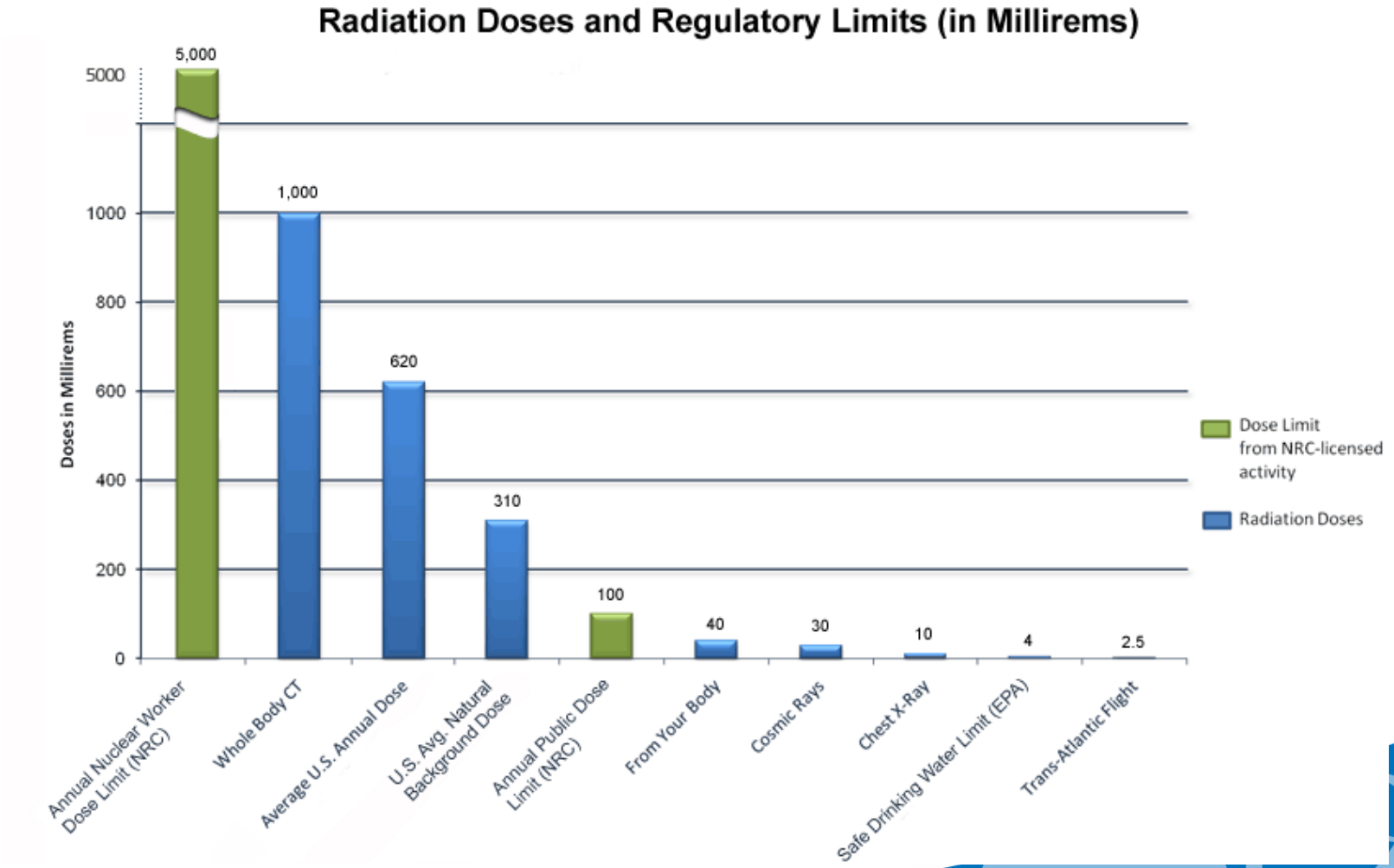

What is in the Proposed Rule?

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The NRC is proposing to amend its regulations that govern low-level radioactive waste (LLRW) disposal facilities to require:

- ✓ New and revised site-specific technical analyses to demonstrate that the performance objectives are met.
- ✓ To permit the development of site-specific criteria for LLRW acceptance based on the results of these analyses.
- ✓ To facilitate implementation and to better align the requirements with current health and safety standards.
- ✓ To ensure licensing decisions are based on defense-in-depth protections.

This proposed rule would affect LLRW disposal licensees or license applicants that are regulated by the NRC or the Agreement States.

Who will perform these Technical Analyses?
Commercial LLRW Sites in U.S.

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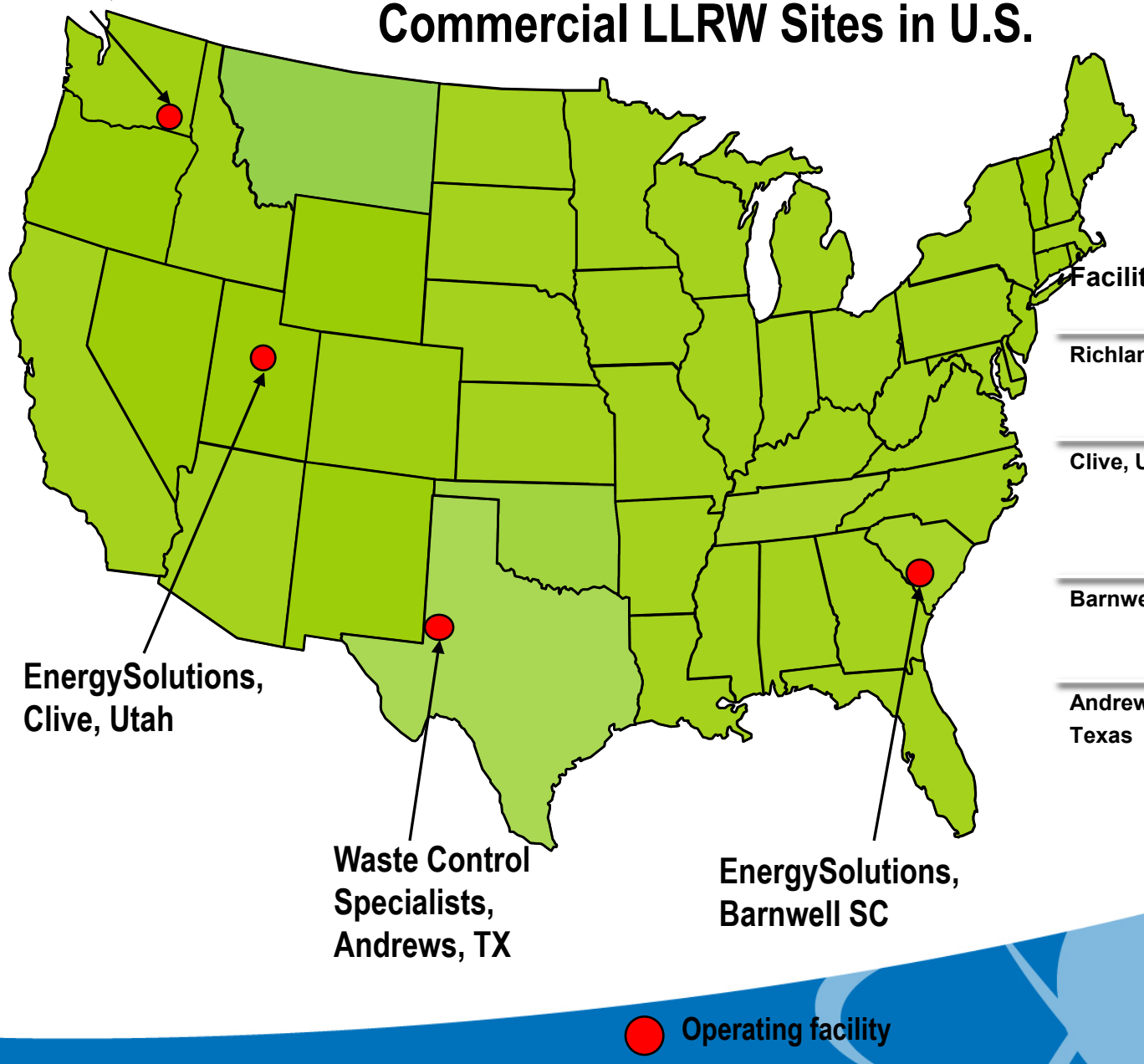

Facility	Waste	Compact Restrictions
Richland, WA	A, B, C	11 Western states in 2 LLW Compacts only
Clive, UT	A only	None, all US generators OK (Compacts must approve)
Barnwell, SC	A, B, C	SC, NJ, CT only (Atlantic Compact)
Andrews Cty, Texas	A, B, C	Texas and VT (Texas Compact), Others with Compact approval

How do I develop the right scenarios for my performance assessment?

Do I need to do a performance period analysis for my site?

How can I demonstrate that my site is stable for 10,000 years?

How do I demonstrate that I have minimized doses for the protective assurance period?

What should I do to demonstrate my facility includes defense-in-depth protections?

How do I develop Waste Acceptance Criteria for my site?

Context for Analyses

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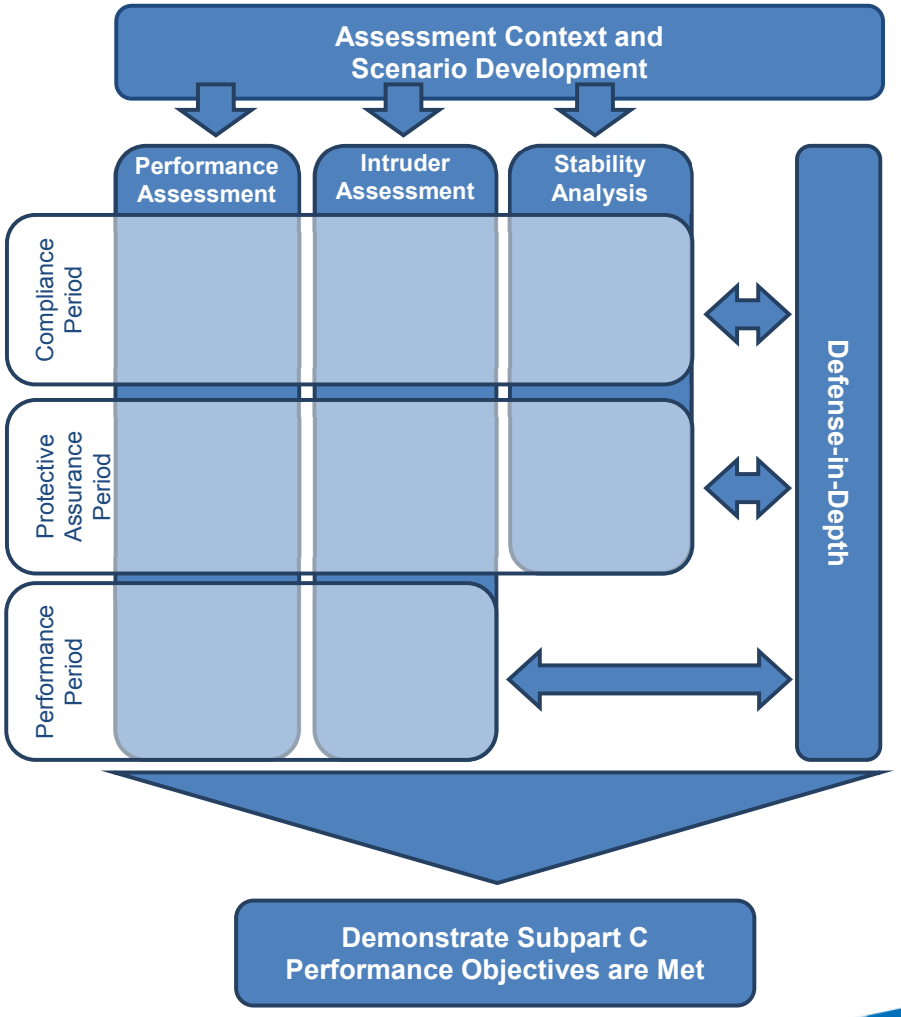

Rule Topics

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- Analyses timeframes
- Performance assessment (PA)
- Intruder assessment (IA)
- Protective assurance period analyses
- Performance period analyses
- Safety case / Defense-in-depth (DID)
- Waste acceptance criteria (WAC)
- Other

Analyses Timeframes

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- Complex issue
- Topic with extensive stakeholder input
- Staff developed white paper for initial recommendation (ML111030586)
- Commission directed changes to staff recommendation in SRM-SECY-13-0075
- Seek stakeholder input, especially on compatibility designation

Analyses Timeframes - Considerations

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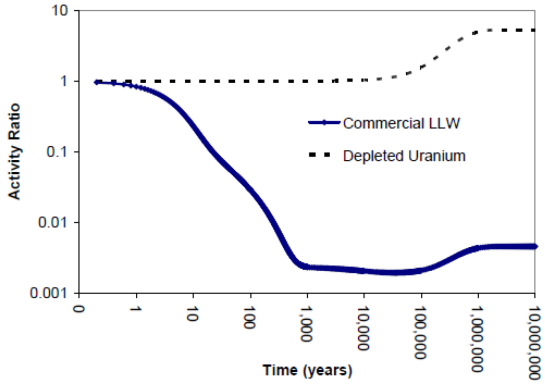
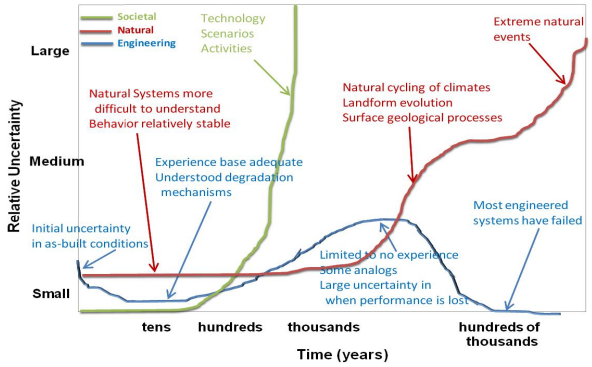
- Waste characteristics
- Uncertainties
- Domestic experience
- International experience
- Policy



Material	Hazard	Hazard Duration	Action	Compliance Period
EPA RCRA	Chem	∞	Disposal	30+ yrs
Uranium Mill Tailings	Rad	LL	Remediate	200 yrs (<1000 yrs)
Part 20 Decommission Criteria	Rad	VSL	Release	1000 yrs
DOE Order 435.1	Rad	SL	Disposal	1000 yrs
LLW Disposal Facility	Rad	SL	Disposal	[10,000 yrs]
EPA Underground Injection	Chem	∞	Disposal	10,000 yrs
DOE WIR Determinations	Rad	SL-LL	Remediate	DOE: 1000 yrs NRC: 10,000 yrs
DOE Siting Guidelines (10 CFR 960)	Rad	LL	Screening Action	100,000 yrs
EPA HLW/SNF/TRU Generic Standards	Rad	LL	Disposal	10,000 yrs
EPA HLW/SNF Site-Specific Standards	Rad	LL	Disposal	10,000 yrs – 15 mrem 1,000,000 yrs – 100 mrem



What are the timeframes and dose limits for the analyses?

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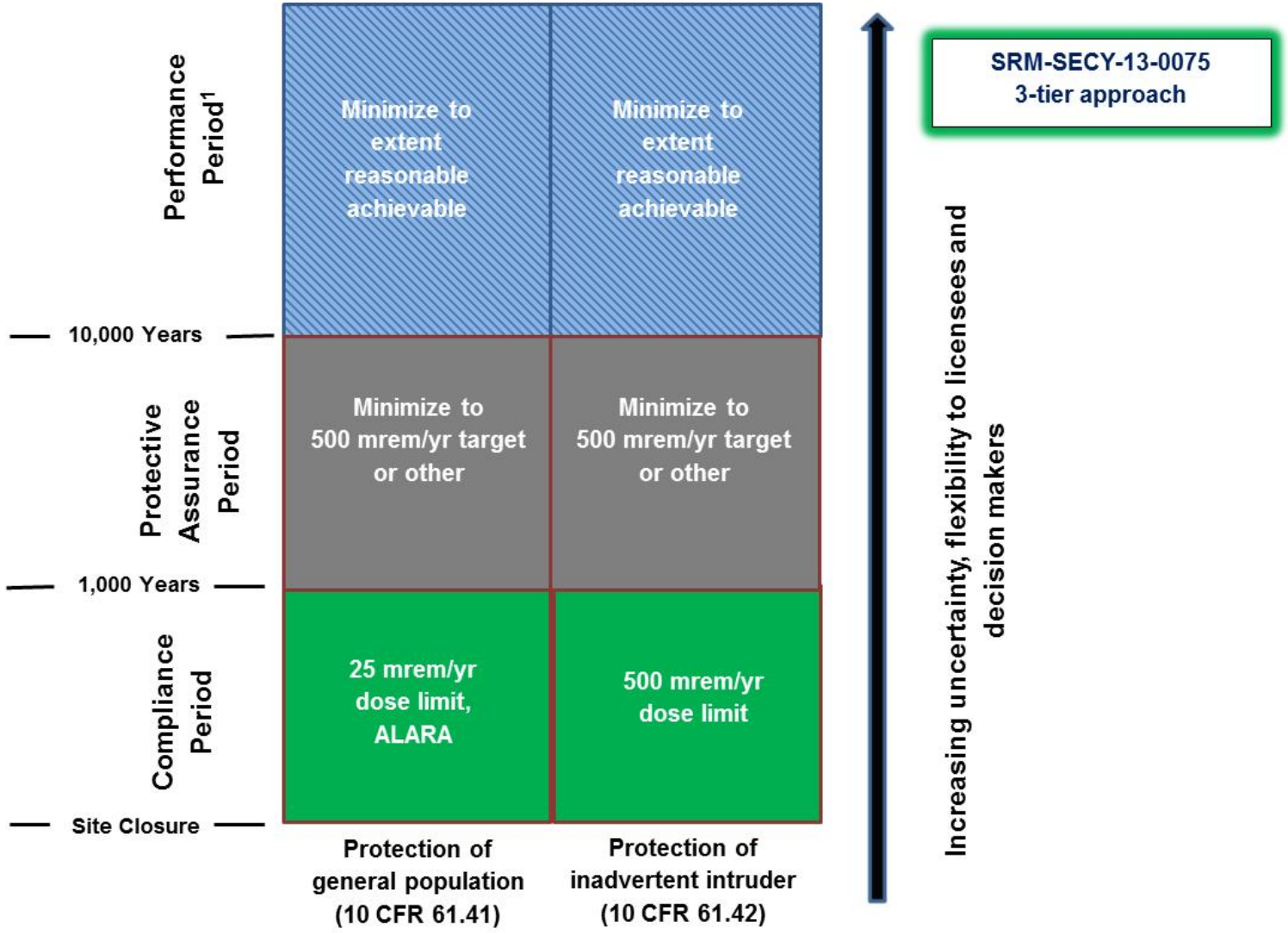

[1] Only applicable if concentrations on a facility-averaged basis are above 10 CFR 61.13(e) Table A

Analyses Timeframes

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Long-lived waste means waste containing radionuclides (1) where more than 10 percent of the initial activity of a radionuclide remains after 10,000 years (e.g., long-lived parent), (2) where the peak activity from progeny occurs after 10,000 years (e.g., long-lived parent – short-lived progeny), or (3) where more than 10 percent of the peak activity of a radionuclide (including progeny) within 10,000 years remains after 10,000 years (e.g., short-lived parent – long-lived progeny).

Compliance period is the time out to 1,000 years after closure of the disposal facility.

Protective assurance period is the period from the end of the compliance period through 10,000 years following closure of the site.

Performance period is the timeframe established for considering waste and site characteristics to evaluate the performance of the site after the protective assurance period.

Analyses Timeframes

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Seeking feedback on:

- Overall approach
- Compatibility
- Long-lived waste definition

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Comments and questions

Performance Assessment

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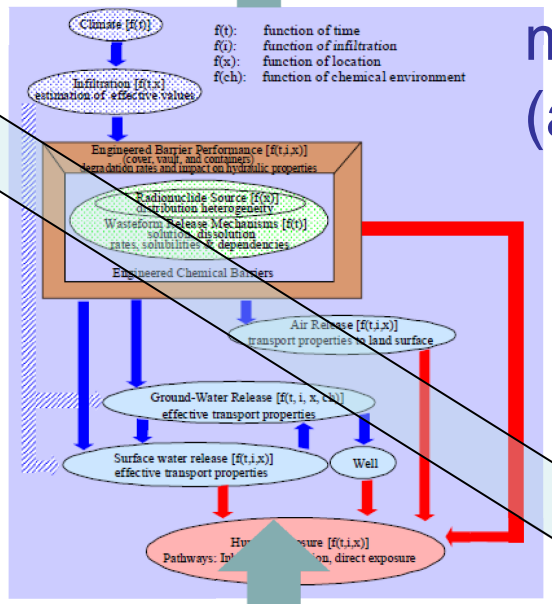
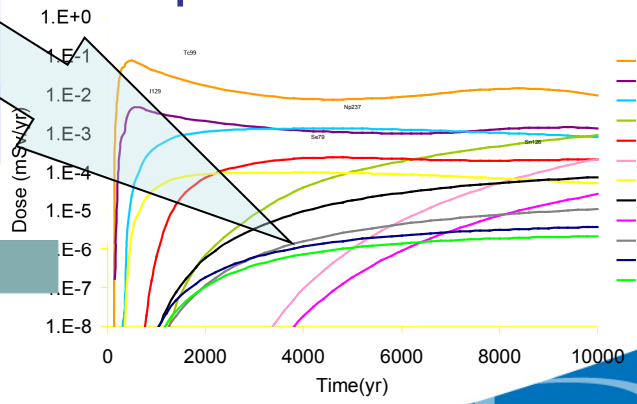
Real system

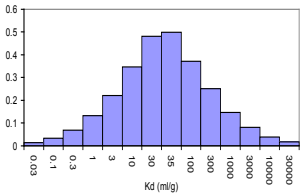
Mathematical model (abstraction)

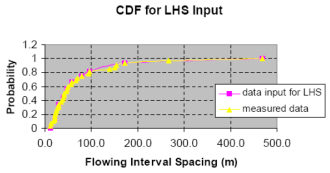


Model Support

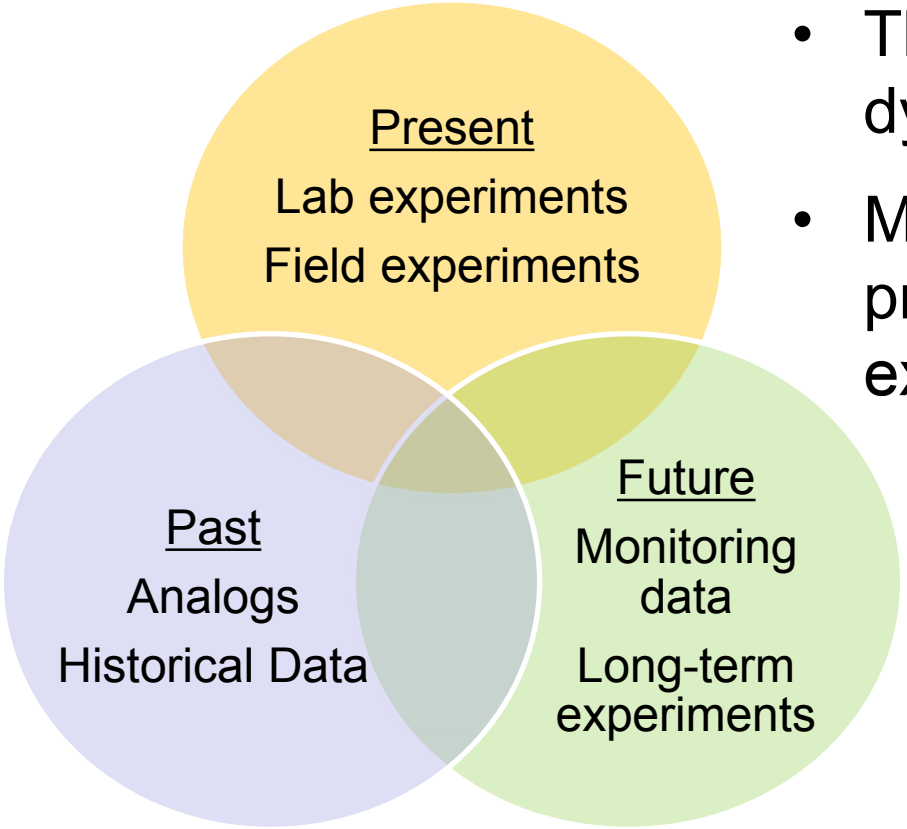
Estimated future performance



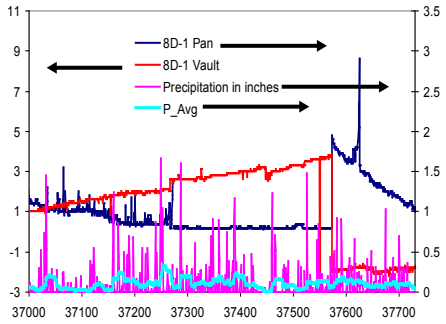




Model Support - Past, Present, and Future Conditions



- The real world can be highly dynamic.
- Model support should be provided for the full range of expected future conditions.



Performance Assessment

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- Performance assessment is not a new topic – renaming of technical analyses
- Proposed modifications modernize the technical analyses requirements
- New requirements in 61.13:
  - Scope (features, events, and processes)
  - Uncertainty and variability
  - Model support

IMPLICIT

EXPLICIT

- Requirement to update the performance assessment at closure
- Modified siting characteristics consistent with disposal of long-lived waste

Performance Assessment

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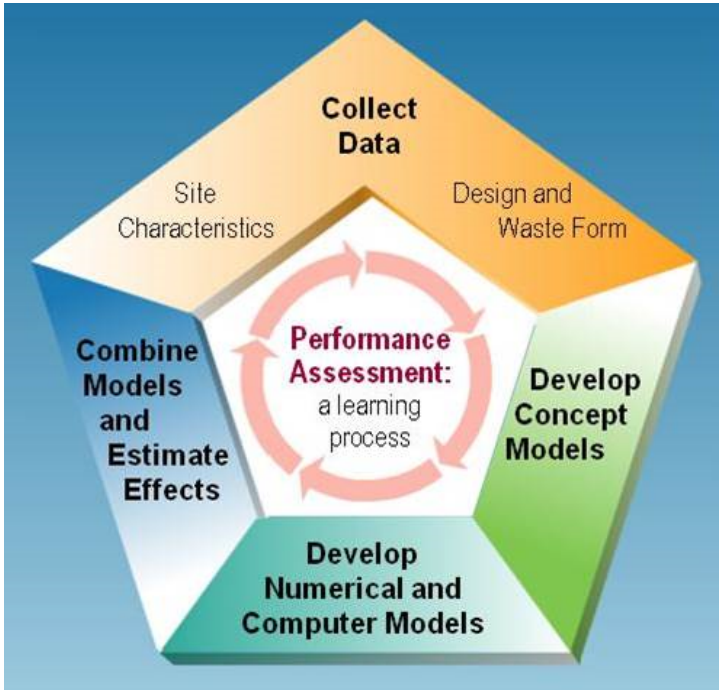
61.28: Updated PA at closure

61.50: Modified as a result of PA requirements for long-lived waste disposal



61.58: WAC "or" approach developed that allows the use of PA results

61.13: Provide model support and consider alternative conceptual models

61.13: Features, events, and processes (scope)

61.13: Results of PA used in DID analysis

61.13: Explicit consideration of uncertainty and variability

Performance Assessment

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Performance assessment is an analysis that (1) identifies the features, events, and processes that might affect the disposal system; (2) examines the effects of these features, events, and processes on the performance of the disposal system; and (3) estimates the annual dose to any member of the public caused by all significant features, events, and processes.

Hazard Map Example

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Figure B-3: Areas of potential flooding that may require additional site characterization and analysis (FEMA, 2012; FEMA, 1998; ESRI, 2008a; ESRI, 2008b)

Performance Assessment

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Seeking feedback on:

- Suitability of using technical analyses to evaluate the disposal of long-lived waste
- New technical analyses requirements (61.13)
- Modifications to siting characteristics requirements (61.50)
- Requirement to update the PA at closure (61.28)

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Comments and questions

Intruder Assessment

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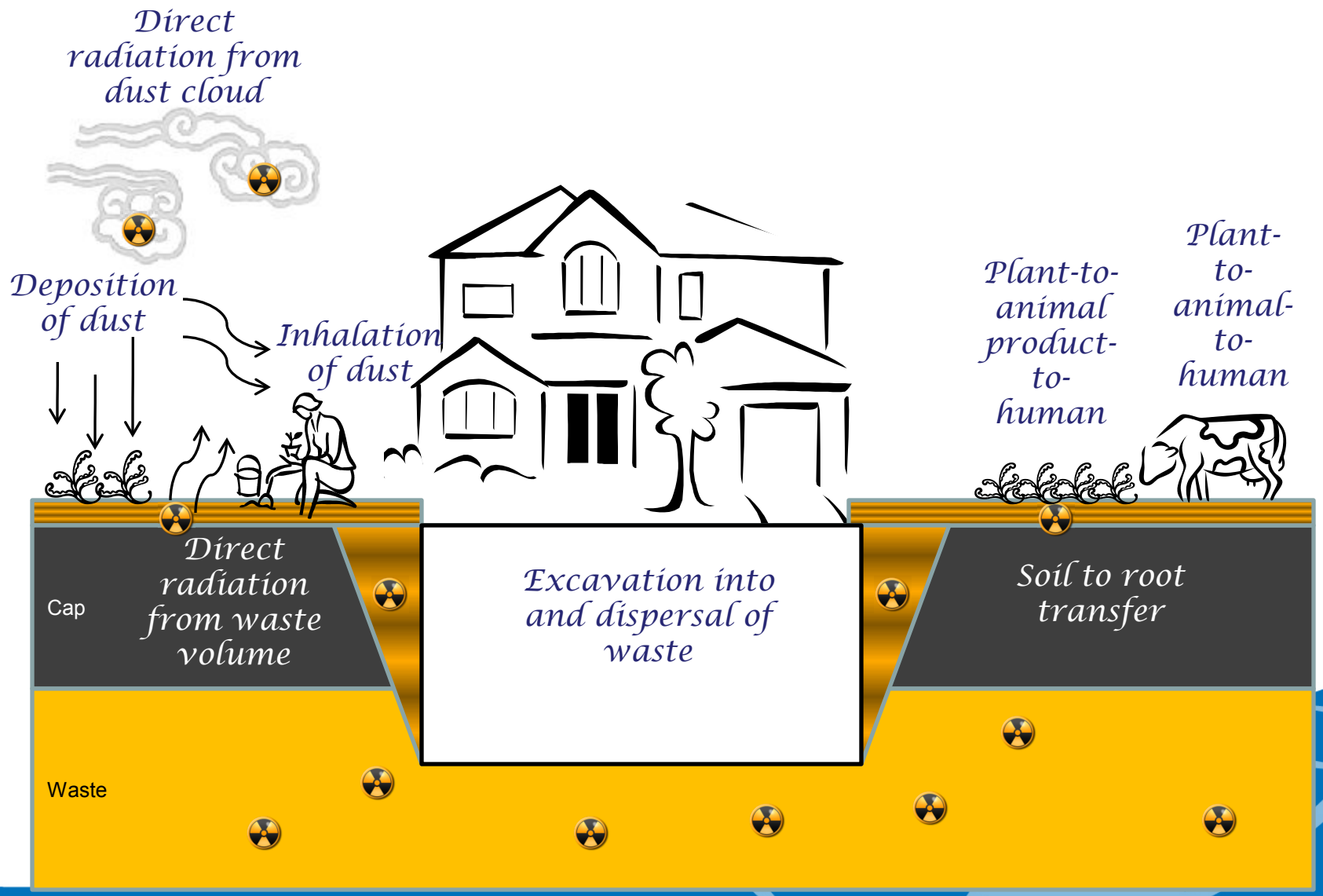

Inadvertent Intruder Assessment

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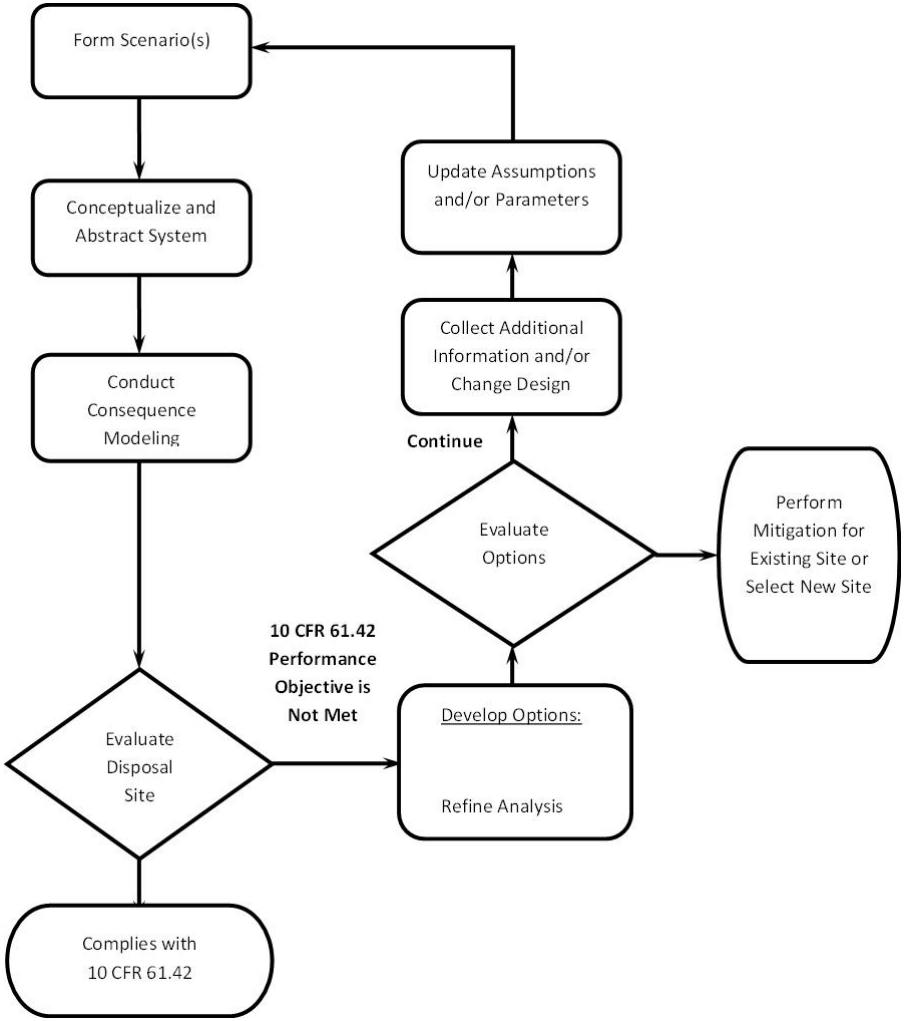
- Inadvertent Intruder Assessment is a new analysis
- Proposed modifications require a stylized analysis instead of solely relying on waste classification and the underlying generic analysis used to develop waste classification
- New requirements in 61.13:
  - Scope
  - Intruder Barriers
  - Uncertainty and variability
- Performance objective in 61.42
- Requirement to update intruder assessment at closure

Intruder Assessment



- Requires an intruder assessment analysis
- Based on intrusion scenarios that are realistic and consistent with expected activities in and around the disposal site at the time of site closure
- Dose limit of 500 mrem for compliance period

Inadvertent Intruder Assessment

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Seeking feedback on:

- Revised and new definitions for intruder assessment (61.2)
- Revised concepts on intruder assessment (61.7)
- New technical analyses requirements (61.13)
- Requirement to update intruder assessment at closure (61.28)
- Revised performance objective for intruder assessment (61.42)

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Comments and questions

Protective Assurance Analyses

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- Second tier of the analyses timeframe
- Required for all types of low-level waste
- Proposed as an optimization type process, rather than comparison to a dose limit
- Goal → minimize doses
- Simplest approach is to extend the performance assessment and intruder assessment analyses
- Approach in guidance:

High risk = High effort

Low risk = Low effort

Protective Assurance Analyses

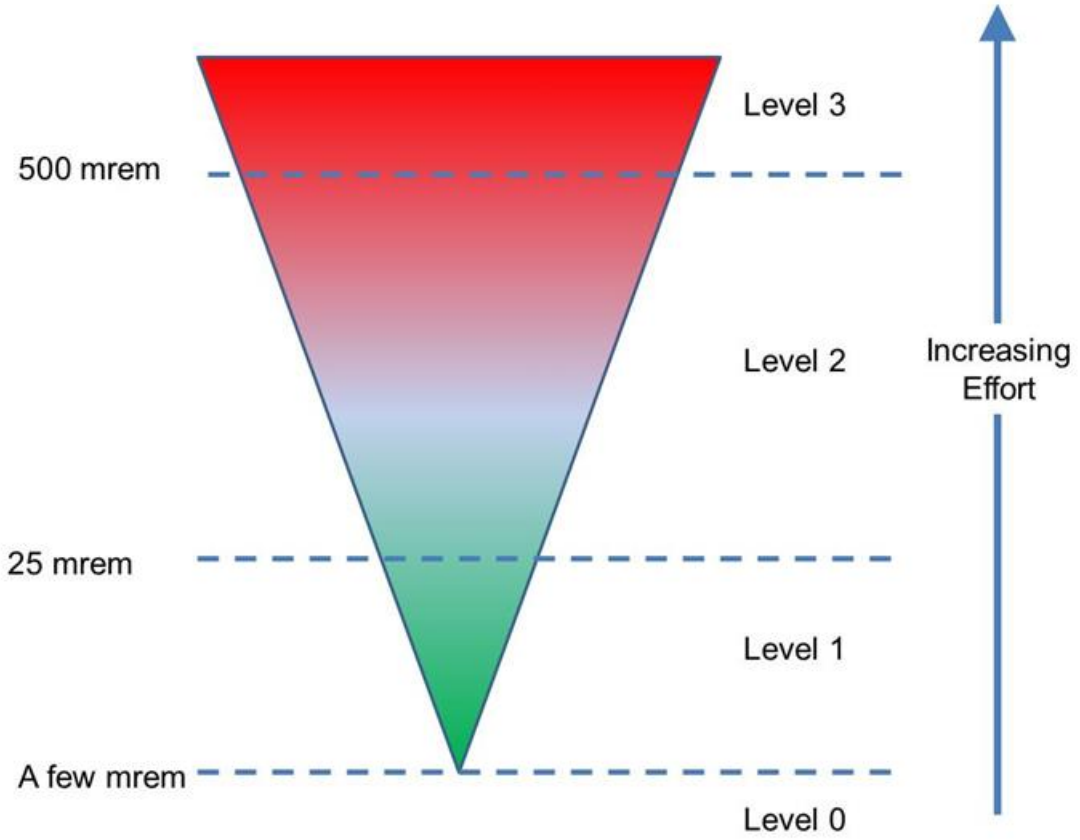

Figure 6-1 Analyses Framework for the Minimization Process for the Protective Assurance Period Analyses Applied to 10 CFR 61.41(b)

Protective Assurance Analyses

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Protecting People and the Environment

Seeking feedback on:

- Protective assurance analyses requirements
- Extension of PA/IA to the protective assurance period
- Optimization approach
- Minimization target
- Risk-based discounting

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Comments and questions

Performance Period Analyses

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- Applicable to times after 10,000 years
- Applies only if sufficient waste is present (Table A)
- Concentrations based on facility average using sum of fractions approach
- Assess how the disposal site limits long-term impacts
- Identify design features and site characteristics
- Minimize impacts to the extent reasonably achievable

Performance Period Analyses

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Table A - Average Concentrations of Long-lived Radionuclides Requiring Performance Period Analyses

Radionuclide	Concentration (Ci/m^3)[1]
C-14	0.8
C-14 in activated metal	8
Ni-59 in activated metal	22
Nb-94 in activated metal	0.02
Tc-99	0.3
I-129	0.008
Long-lived alpha-emitting nuclides[2, 3]	10
Pu-241[3]	350
Cm-242[3]	2,000

[1] Values derived from § 61.55 Class A limits.
[2] Includes alpha-emitting transuranic nuclides as well as other long-lived alpha-emitting nuclides.
[3] Units are nanocuries per gram.

Performance Period Analyses

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(e) Analyses that assess how the disposal site limits the potential long-term radiological impacts, consistent with available data and current scientific understanding. The analyses shall be required for disposal sites with waste that contains radionuclides with average concentrations exceeding the values listed in table A of this paragraph, or if necessitated by site-specific conditions. For wastes containing mixtures of radionuclides found in table A, the total concentration shall be determined by the sum of fractions rule described in paragraph 61.55(a)(7). The analyses must identify and describe the features of the design and site characteristics that will demonstrate that the performance objectives set forth in §§ 61.41(c) and 61.42(c) will be met.

Performance Period Example

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Table 7-1 Long-lived Isotopes Potentially Present in LLW Performance Assessment Inventories

Isotope	Half-life (yr)	Long-lived		LLW PA Inventory[1]	Isotope	Half-life (yr)	Long-lived		LLW PA Inventory[1]
		Parent	Progeny[2]				Parent	Progeny[2]	
Al-26	7.17×10^5	X			U-233	1.59×10^5	X	Th-229	Yes
C-14	5,730	X		Yes	U-234	2.45×10^5	X	Th-230	Yes
Cl-36	3.01×10^5	X		Yes	U-235	7.038×10^8	X	Pa-231	Yes
K-40	1.3×10^9	X			U-236	2.342×10^6	X	Th-232	Yes
Ni-59	7.5×10^4	X		Yes	U-238	4.468×10^9		U-234	Yes
Se-79	1.1×10^6	X			Np-237	2.14×10^6	X	U-233	Yes
Zr-93	1.53×10^6	X			Pu-238	87.7		U-234	Yes
Nb-94	2.0×10^4	X			Pu-239	2.41×10^4	X	U-235	Yes
Tc-99	2.14×10^5	X		Yes	Pu-240	6.54×10^3	X	U-236	Yes
Pd-107	6.56×10^6	X			Pu-241	14.4		Np-237	Yes
Sn-126	1×10^5	X			Pu-242	3.76×10^5	X	U-238	Yes
I-129	1.6×10^7	X		Yes	Pu-244	8.26×10^7	X	Pu-240	
Cs-135	3×10^6	X			Am-241	432		Np-237	Yes
Sm-146	1×10^8	X			Am-242m	16 hr		U-234	Yes
Pm-147	2.62		Sm-147		Am-243	7.38×10^3	X	Pu-239	Yes
Sm-147	1.06×10^{11}	X			Cm-242	0.446		U-234	
Eu-152	13.3		Gd-152		Cm-243	28.5		Am-243	
Gd-152	1.08×10^{14}	X			Cm-244	18.1		Pu-240	
Ra-226	1,600	X		Yes	Cm-245	8.5×10^3	X	Np-237	
Th-229	7.3×10^3	X		Yes	Cm-247	1.56×10^7	X	Am-243	
Th-230	7.7×10^4	X	Ra-226	Yes	Cm-248	3.39×10^5	X	Pu-244	
Th-232	1.41×10^{10}	X		Yes	Cf-249	351		Cm-245	
Pa-231	3.28×10^4	X			Cf-251	898		Am-243	
U-233	1.59×10^5	X	Th-229	Yes	Cf-252	2.64		Cm-248	

Performance Period Analyses

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Seeking feedback on:

- Approach to the performance period analyses
- Use of Class A values as a trigger for the requirements
- Averaging approach to concentrations
- Minimization to the extent reasonably achievable
- The requirement to identify the features that contribute to limiting long-term impacts

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Comments and questions

Safety Case - IAEA

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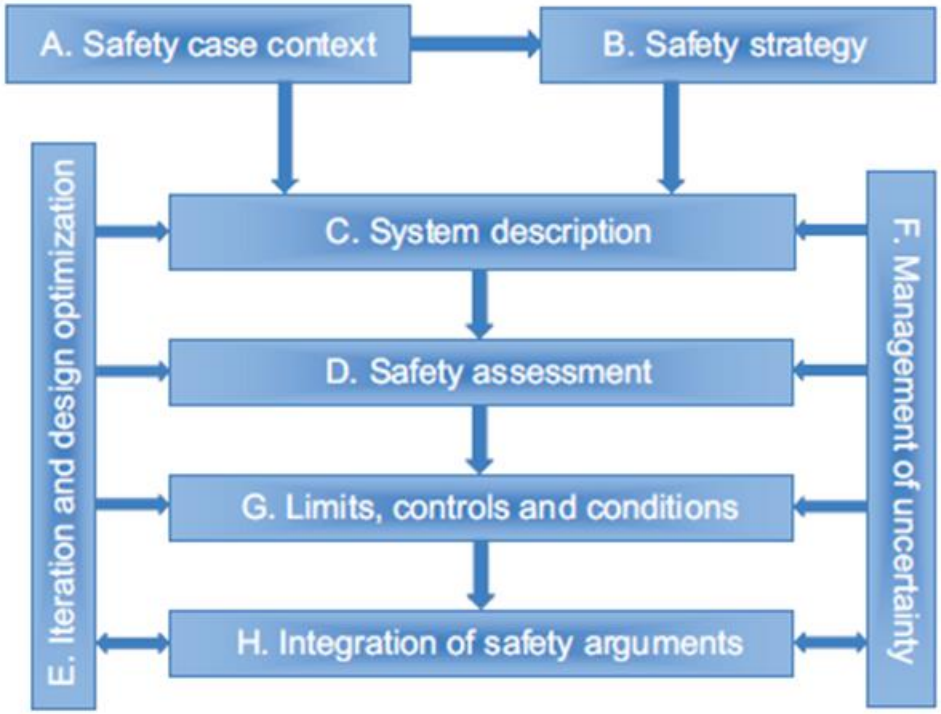
- IAEA approach to safety case is comprehensive
- Safety assessment is an important component but is one of many components
- Specific Safety Guide No. SSG-23



Safety Assessment - IAEA

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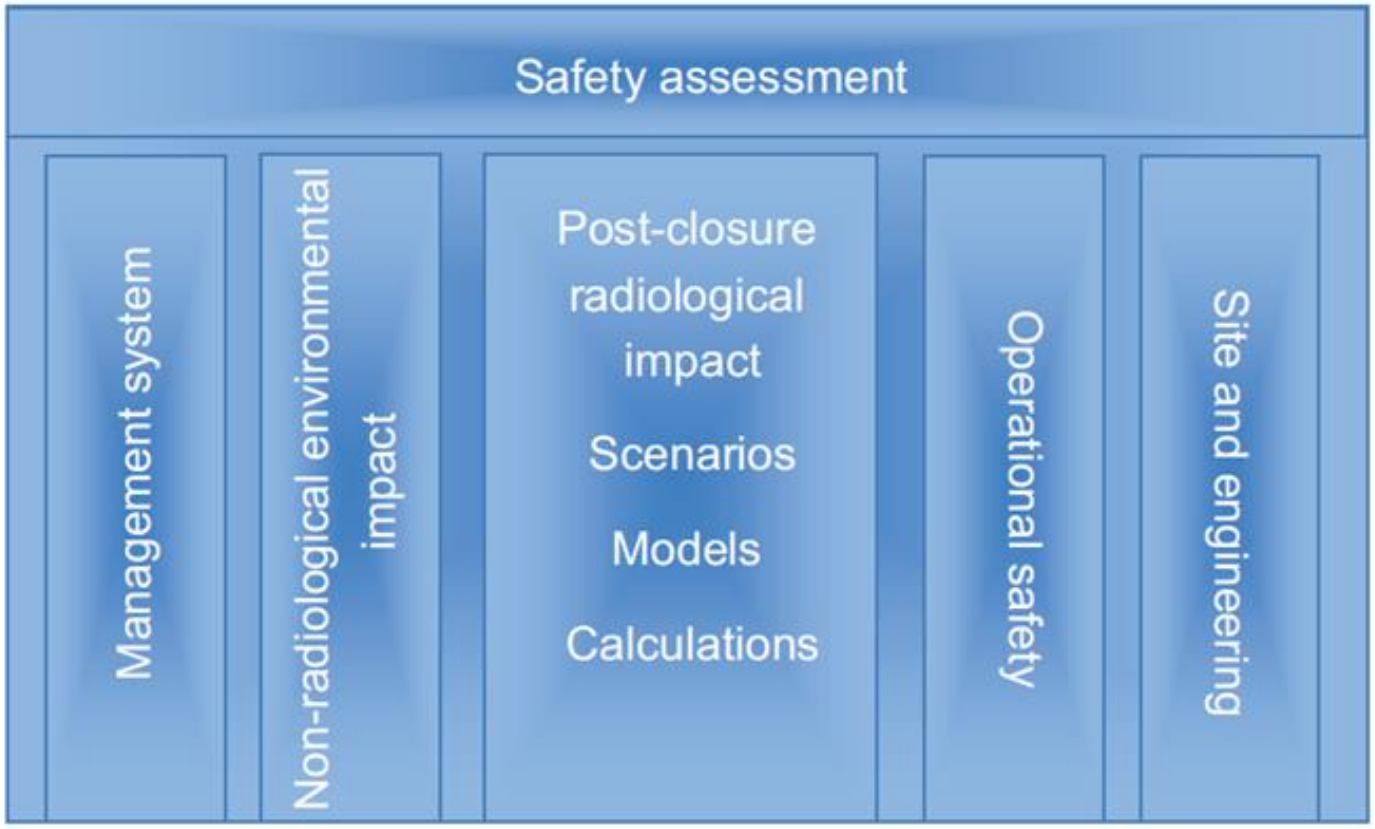

Safety Case/Defense-in-Depth

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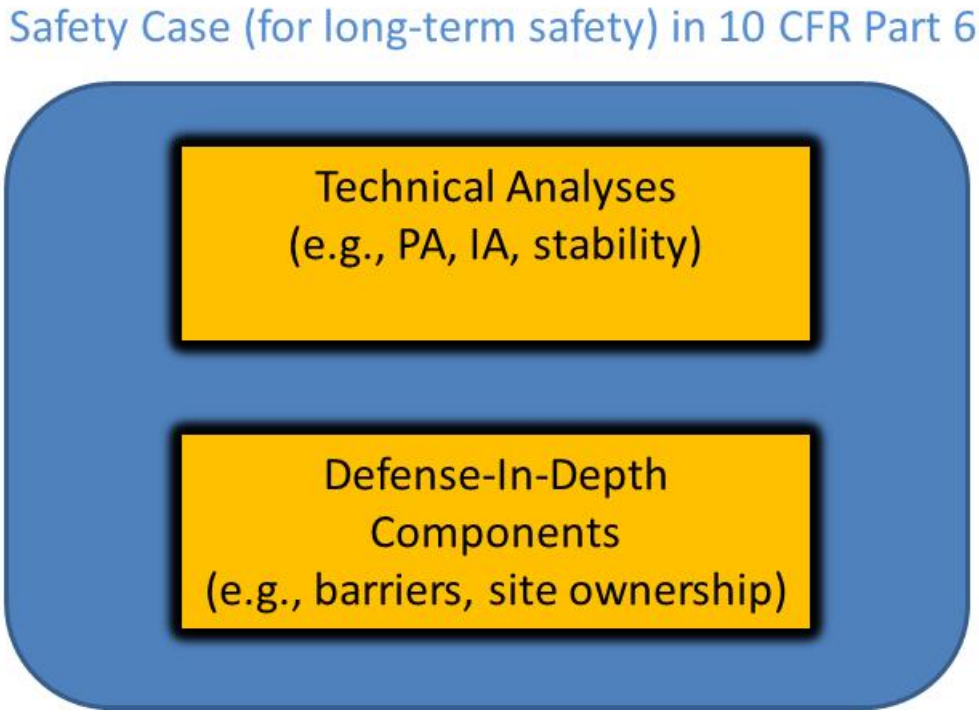
- Proposed rule includes discussion of safety case and defense-in-depth (DID) protections
- Explains how the combination of DID and performance assessment (i.e., safety case) should be used to support the licensing decision



Defense-in-Depth:
The use of multiple, independent, and redundant layers of defense so that no single layer, no matter how robust, is exclusively relied upon for safety.

Safety Case – 61.2

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Safety case is a collection of information that demonstrates the assessment of the safety of a waste disposal facility. This includes technical analyses, such as the performance assessment and intruder assessment, but also includes information on defense-in-depth and supporting evidence and reasoning on the strength and reliability of the technical analyses and the assumptions made therein. The safety case also includes description of the safety relevant aspects of the site, the design of the facility, and the managerial control measures and regulatory controls.

Safety Case/Defense-in-Depth

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Seeking feedback on:

- Definitions for safety case and defense-in-depth (61.2)
- Concepts regarding safety case and defense-in-depth (61.7)
- Requirements for a safety case (61.10)
- New technical analyses requirements for defense-in-depth (61.13)
- Requirement to update defense-in-depth at closure (61.28)

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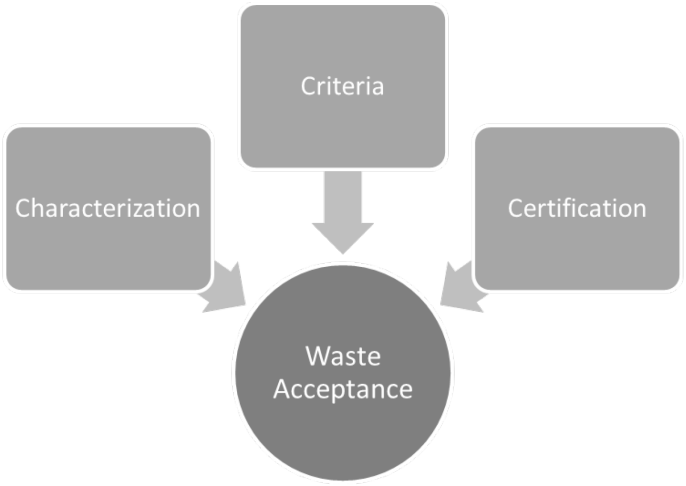
Comments and questions

Waste Acceptance



- New requirements for developing waste acceptance criteria (WAC) using either:
  - 61.55 waste classification system, or
  - Site-specific WAC
- New 61.58 focuses on three areas:
  - WAC
  - Waste Characterization
  - Waste Certification

Waste Acceptance – 61.7

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(e) *Waste acceptance.* Demonstrating compliance with the performance objectives also requires a determination of criteria for the acceptance of waste. The criteria can be determined from the results of the technical analyses that demonstrate compliance with the performance objectives for any land disposal facility **or**, for a near-surface disposal facility, the waste classification requirements of subpart D of this part.

Waste Acceptance

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Seeking feedback on:

- Concepts regarding waste acceptance (61.7)
- Requirements for waste acceptance (61.58)

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Comments and questions

Guidance Document

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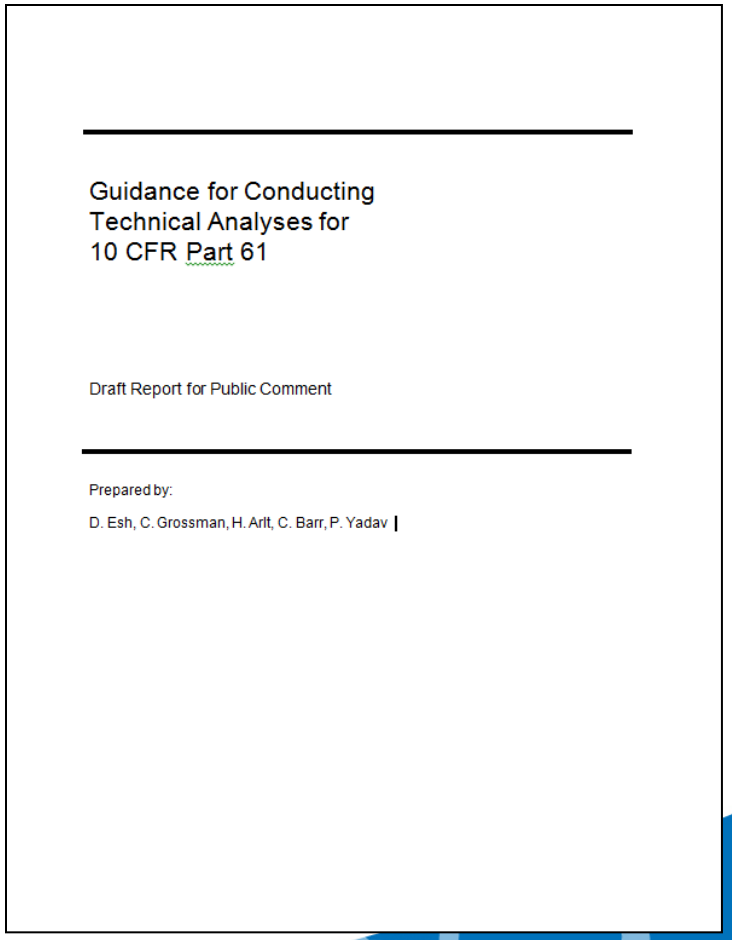
- Overview/context (Chapter 1)
- Examples, tables, figures
- Use of other NRC guidance documents (Chapter 11)
- 434 pages, 18 pages of references
- Glossary
- Appendices (e.g. hazard maps, FEPs)


Guidance for Conducting
Technical Analyses for
10 CFR Part 61

Draft Report for Public Comment

Prepared by:

D. Esh, C. Grossman, H. Arlt, C. Barr, P. Yadav

ML15056A516 Guidance for Conducting Technical Analyses for 10 CFR Part 61

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Backup

Timeframes - context

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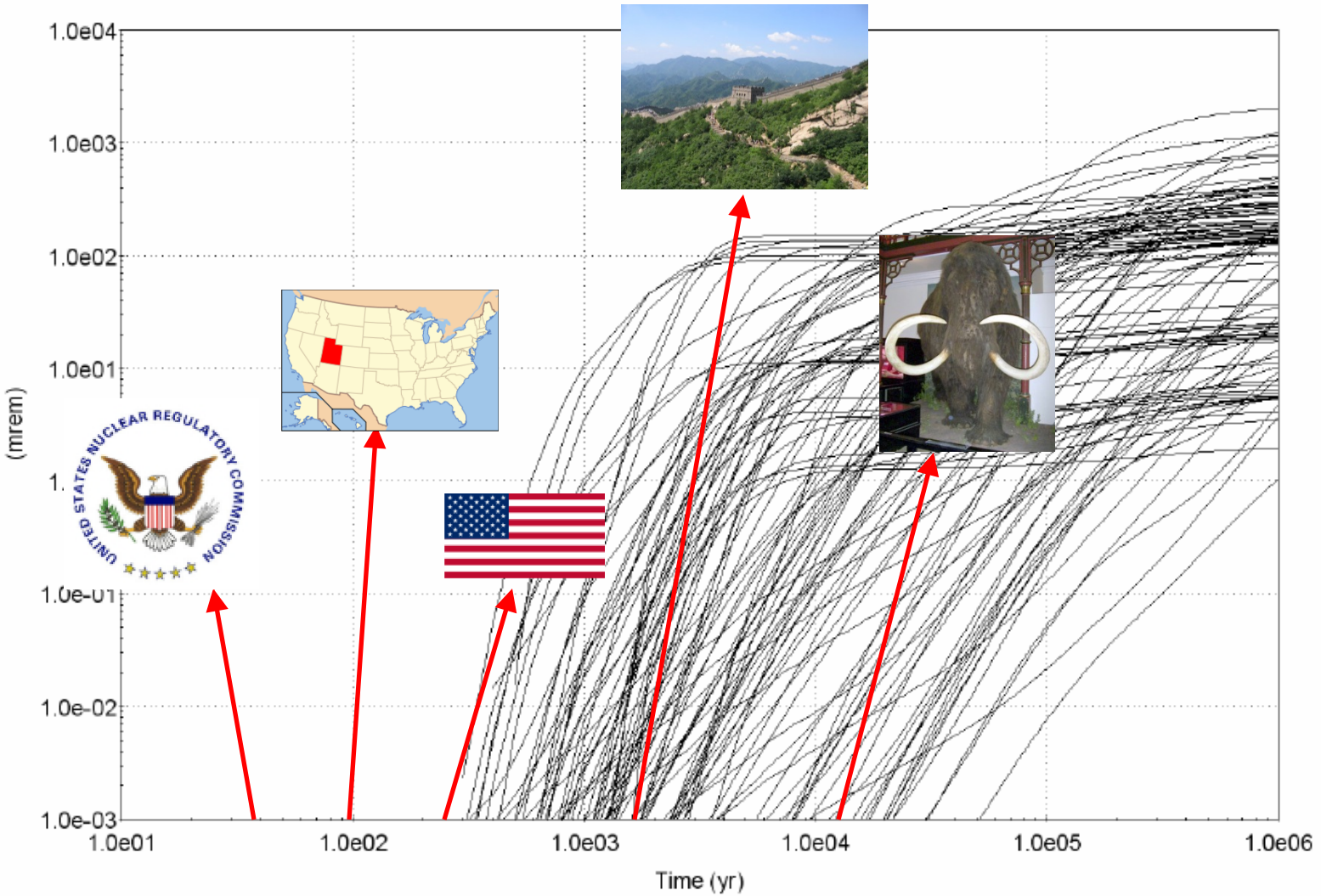
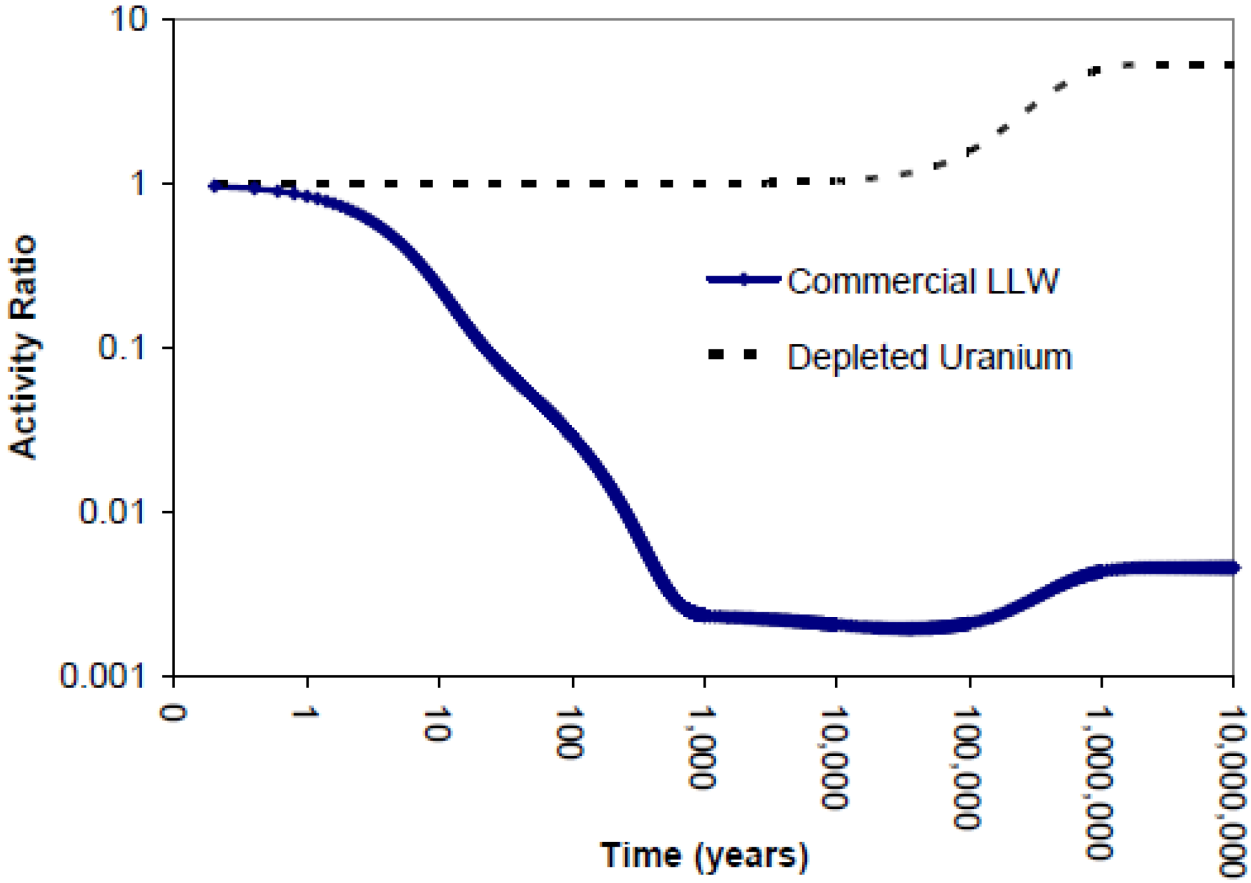
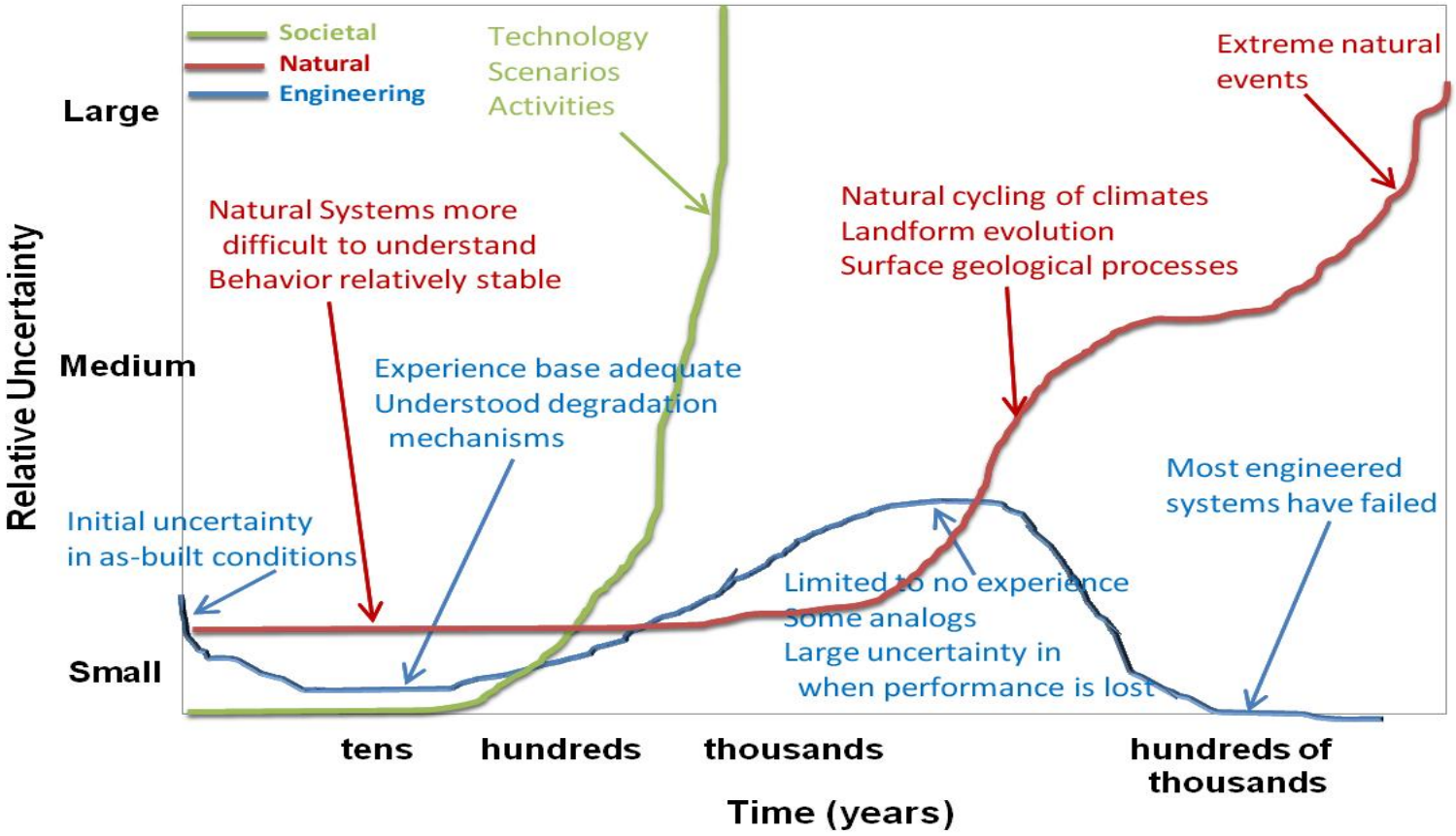


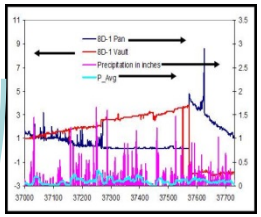
http://en.wikipedia.org/wiki/File:GreatWall_2004_Summer_4.jpg
http://en.wikipedia.org/wiki/File:Mammoth2.jpg


10
1
0.1
0.01
0.001
Activity Ratio
Commercial LLW
Depleted Uranium
0
1
10
100
1,000
10,000
100,000
1,000,000
10,000,000
Time (years)

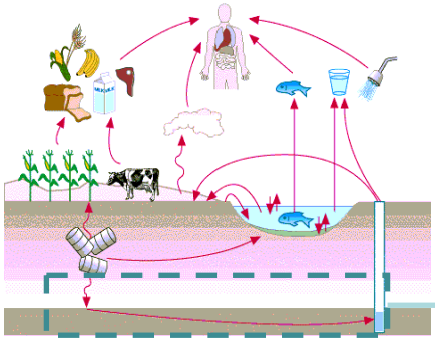

Societal
Natural
Engineering
Technology
Scenarios
Activities
Extreme natural events
Large
Medium
Small
Relative Uncertainty
Natural Systems more difficult to understand
Behavior relatively stable
Natural cycling of climates
Landform evolution
Surface geological processes
Experience base adequate
Understood degradation mechanisms
Most engineered systems have failed
Initial uncertainty in as-built conditions
Limited to no experience
Some analogs
Large uncertainty in when performance is lost
tens
hundreds
thousands
hundreds of thousands
Time (years)

Material	Hazard	Hazard Duration	Action	Compliance Period
EPA RCRA	Chem	∞	Disposal	30+ yrs
Uranium Mill Tailings	Rad	LL	Remediate	200 yrs (<1000 yrs)
Part 20 Decommission Criteria	Rad	VSL	Release	1000 yrs
DOE Order 435.1	Rad	SL	Disposal	1000 yrs
LLW Disposal Facility	Rad	SL	Disposal	[10,000 yrs]
EPA Underground Injection	Chem	∞	Disposal	10,000 yrs
DOE WIR Determinations	Rad	SL-LL	Remediate	DOE: 1000 yrs NRC: 10,000 yrs
DOE Siting Guidelines (10 CFR 960)	Rad	LL	Screening Action	100,000 yrs
EPA HLW/SNF/TRU Generic Standards	Rad	LL	Disposal	10,000 yrs
EPA HLW/SNF Site-Specific Standards	Rad	LL	Disposal	10,000 yrs – 15 mrem 1,000,000 yrs – 100 mrem

Example - PA

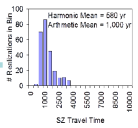


Site characterization data and other information



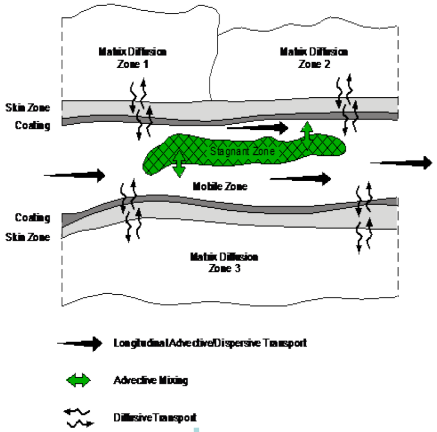
Performance assessment conceptual model development

Hydrologic conceptual model development

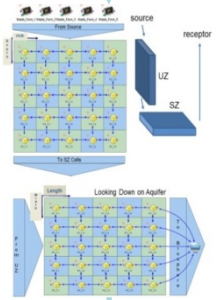


Estimated system performance

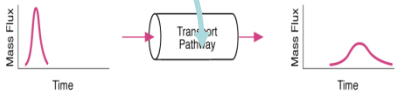
Abstracted hydrologic model



Hydrologic conceptual model



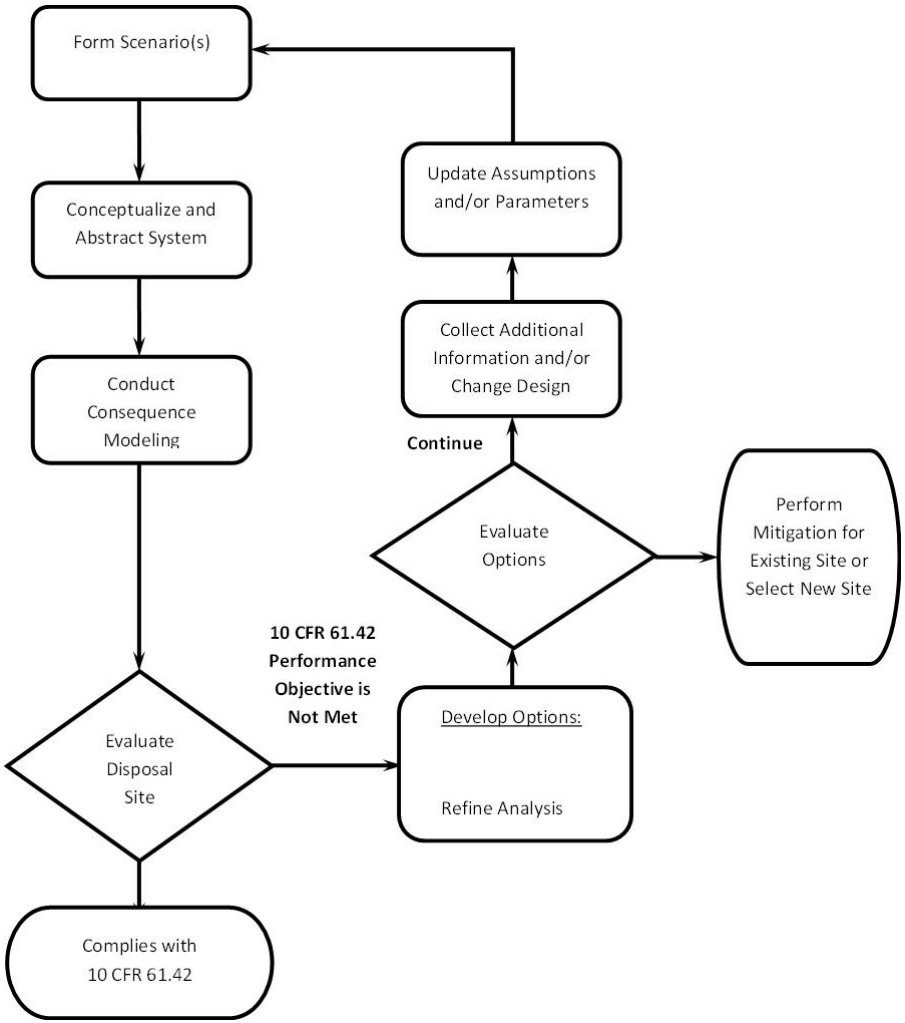
Boundary conditions
Spatial and temporal discretization

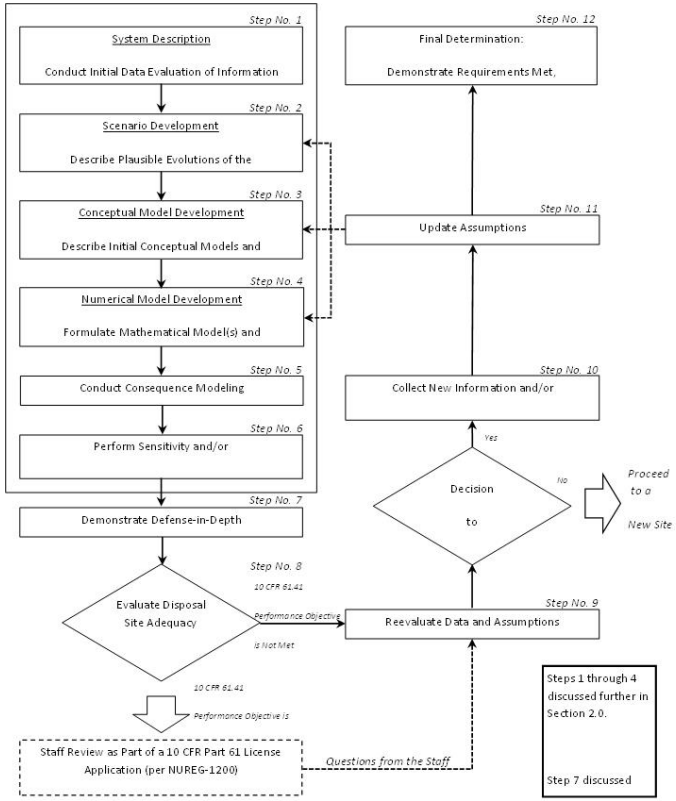


Numerical model development

$$m'_{is} = -m_{is}\lambda_s + \sum_{p=1}^{NPs} m_p \lambda_p f_{ps} R_{sp} (A_s/A_p) + \sum_{c=1}^{NCi} f_{cs} + S_{is}$$

Flowcharts


Form Scenario(s)
Conceptualize and Abstract System
Conduct Consequence Modeling
Evaluate Disposal Site
Complies with 10 CFR 61.42
10 CFR 61.42 Performance Objective is Not Met
Develop Options:
Refine Analysis
Update Assumptions and/or Parameters
Collect Additional Information and/or Change Design
Continue
Evaluate Options
Perform Mitigation for Existing Site or Select New Site


Step No. 1
System Description
Conduct Initial Data Evaluation of Information
Step No. 2
Scenario Development
Describe Plausible Evolutions of the
Step No. 3
Conceptual Model Development
Describe Initial Conceptual Models and
Step No. 4
Numerical Model Development
Formulate Mathematical Model(s) and
Step No. 5
Conduct Consequence Modeling
Step No. 6
Perform Sensitivity and/or
Step No. 7
Demonstrate Defense-in-Depth
Step No. 8
10 CFR 61.41
Evaluate Disposal Site Adequacy
Performance Objective Is Not Met
10 CFR 61.41
Performance Objective is
Staff Review as Part of a 10 CFR Part 61 License Application (per NUREG-1200)
Questions from the Staff
Step No. 9
Reevaluate Data and Assumptions
Step No. 10
Collect New Information and/or
Yes
Decision
No
Proceed to a New Site
Step No. 11
Update Assumptions
Step No. 12
Final Determination:
Demonstrate Requirements Met,
Steps 1 through 4 discussed further in Section 2.0.
Step 7 discussed

Site-Stability Example

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